

800903

Date

K-25 Classification & Information Control Officer

[Signature]
Martha Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin

FOR THE OAK RIDGE AREA (Report for Fourth Quarter 1961)

Document # _____ Unnumbered _____ Date: 3/62

APPROVAL FOR RELEASE

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: DISSEMINATION TO THE PUBLIC OF DATA ON
ENVIRONMENTAL LEVELS OF RADIOACTIVITY

As requested, we are enclosing eighty copies of the report for the fourth quarter, 1961, on Environmental Levels of Radioactivity for the Oak Ridge Area.

Yours very truly,

UNION CARBIDE NUCLEAR COMPANY

[Signature: C. E. Larson]
C. E. Larson
Vice President

CEL:KZM:dw
Enclosures

cc w/encls.: F. R. Bruce
F. L. Culler
J. C. Hart (10)
W. H. Jordan
K. Z. Morgan
ORGDP, Safety and Health
Department (2)
J. A. Swartout (2)
J. P. Murray (4)

DIVISION OF



CORPORATION

OFFICE BOX P. OAK RIDGE, TENNESSEE

March 29, 1962

#504

ENVIRONMENTAL LEVELS OF RADIOACTIVITY
FOR THE OAK RIDGE AREA

(Report for Fourth Quarter 1961)

Compiled by the

Applied Health Physics Section

Health Physics Division

OAK RIDGE NATIONAL LABORATORY

Introduction

Radioactive waste materials arising from the operation of atomic energy installations at Oak Ridge are collected, treated, and disposed of according to their physical states.

Solid wastes are buried in a Conasauga shale formation. This shale has a marked ability to fix radioactive materials by an ion exchange mechanism.

Liquid wastes which contain long-lived fission products are confined in storage tanks or are released to trenches and pits located in the Conasauga shale formation. Low level liquid wastes are discharged, after preliminary treatment, to the surface streams.

Air that may become contaminated by radioactive materials is exhausted to the atmosphere from several tall stacks after treatment by means of filters, scrubbers, and/or precipitators.

This report presents data on the environmental levels of radioactivity for the Oak Ridge Area and compares the data with established maximum permissible concentrations.

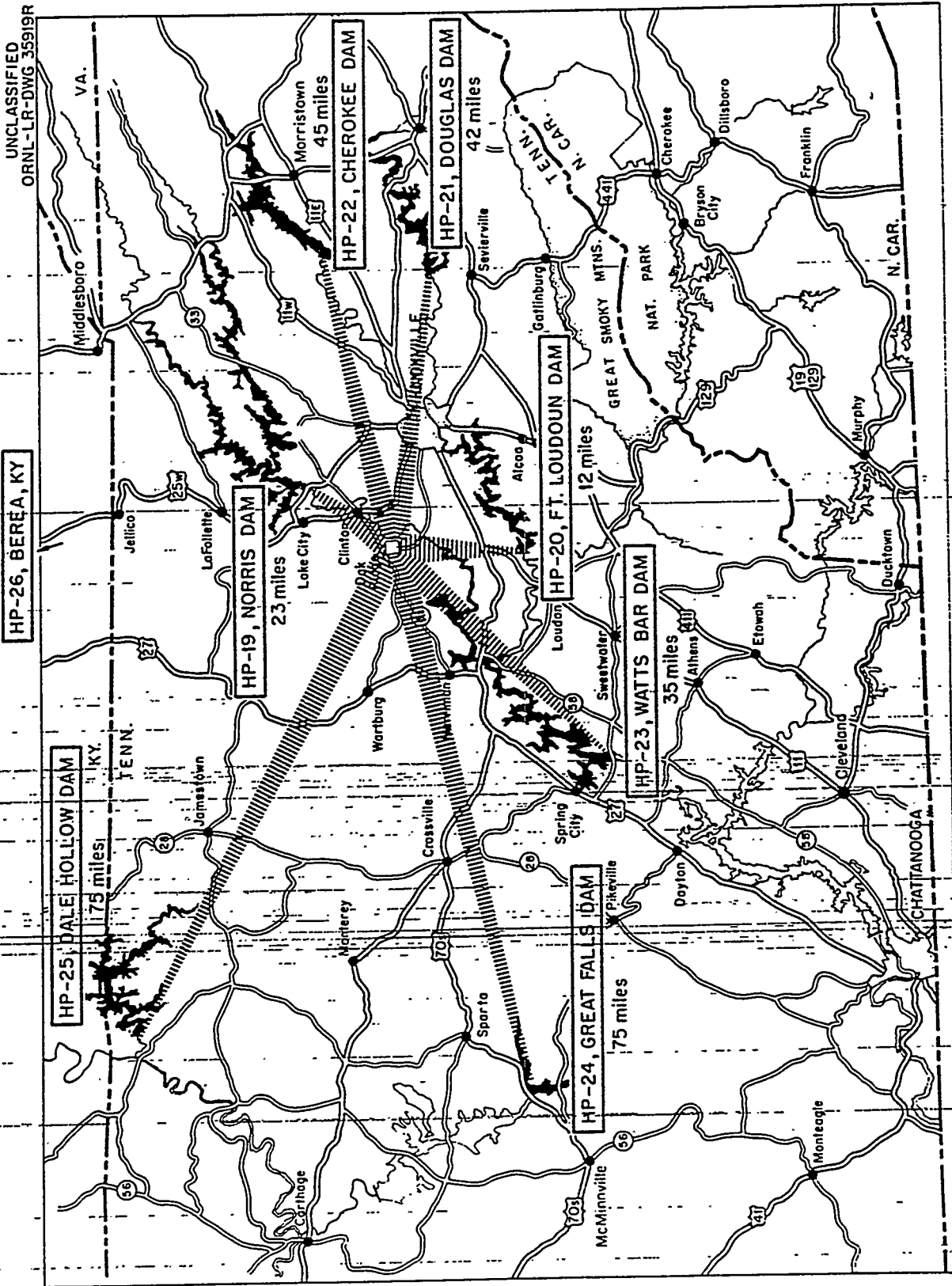
Air Monitoring

Atmospheric contamination by long-lived fission products and fall-out occurring in the general environment of East Tennessee are monitored by two systems of monitoring stations. One system consists of seven stations which encircle the plant areas (Fig. 1) and provides data for evaluating the impact of all Oak Ridge Operations on the immediate environment. A second system consists of eight stations encircling the Oak Ridge Area at distances of from 12 to 120 miles (Fig. 2). This system provides data to aid in evaluating local conditions and to assist in determining the spread or dispersal of contamination should a major incident occur. Sampling is carried out by passing air continuously through a filter paper. Data collected are accumulated and tabulated in average $\mu\text{c}/\text{cc}$ of air sampled.

Atmospheric contamination by alpha-emitting materials, interpreted as uranium, is determined by taking continuous air samples at five locations on a five-mile radius from the Oak Ridge Gaseous Diffusion Plant (Fig. 3).

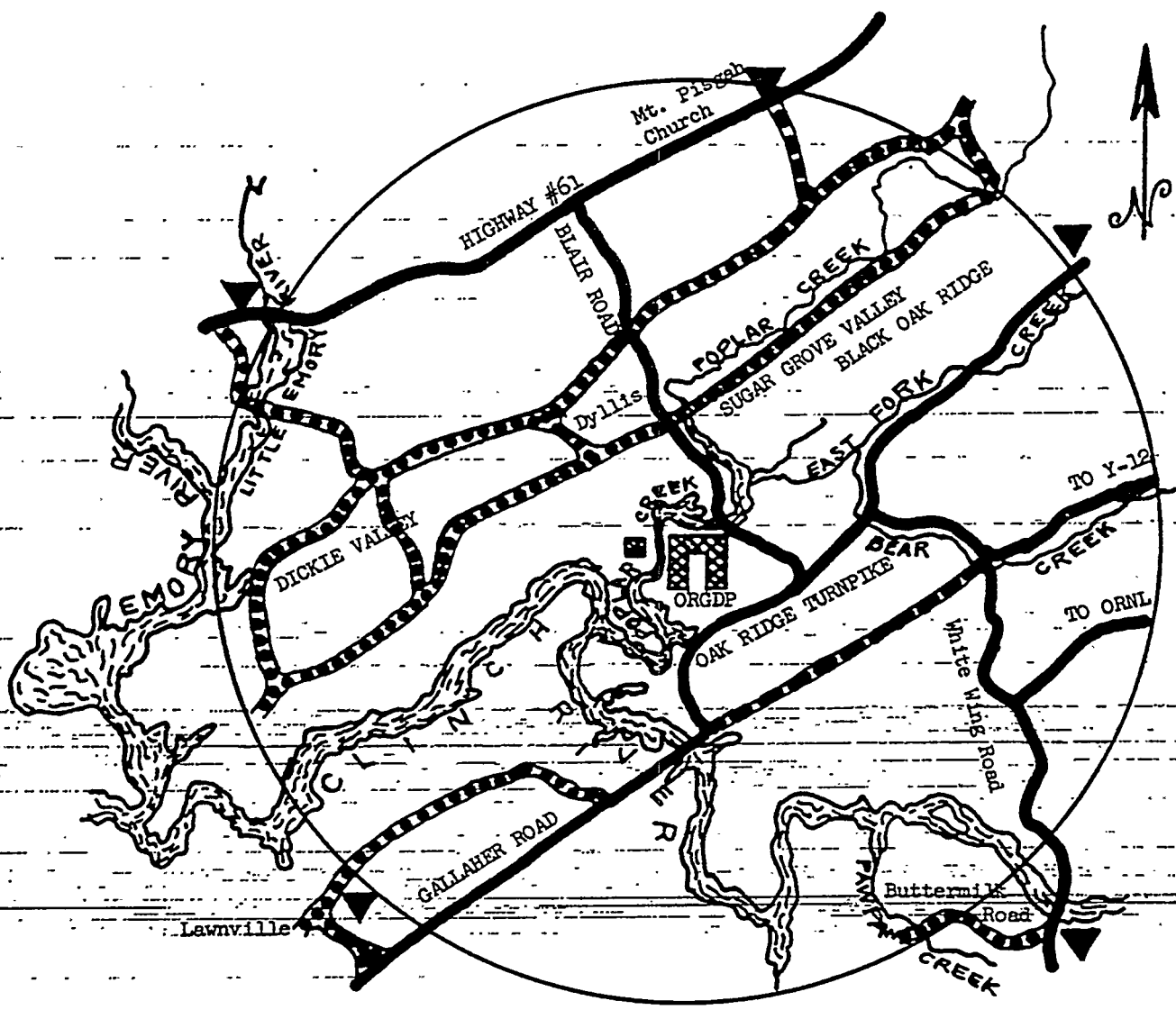
Water Monitoring

Large volume, low level liquid wastes originating at Oak Ridge National Laboratory are discharged, after some preliminary treatment, into the Tennessee River system by way of White Oak Creek and the Clinch River. Liquid wastes originating at the Oak Ridge Gaseous Diffusion Plant and the Y-12 Plant are discharged to Poplar Creek and thence to the Clinch River. Releases are



STATION SITES FOR REMOTE AIR MONITORING SYSTEM

Figure 2



SAMPLING POINTS OF OUTSIDE ENVIRONS -- ORGDP

AIR

▼ Sampling Location - Five Miles from Plant

--Figure 3 --

controlled so that resulting average concentrations in the Clinch River comply with the maximum permissible levels for populations in the neighborhood of a controlled area as recommended by the National Committee on Radiation Protection (NCRP). The concentration of radioactivity leaving White Oak Creek is measured and concentration values for the Clinch River are calculated on the basis of the dilution provided by the river.

Radioactive liquid wastes are sampled at a number of locations as shown in Figs. 4 and 5. Samples are taken at a number of locations in the Clinch River, beginning at a point above the entry of wastes into the river and ending at Center's Ferry near Kingston, Tennessee. Stream gauging operations are carried on continuously by the United States Geological Survey to obtain dilution factors for calculating the probable concentrations of wastes in the river.

Samples are analyzed for the long-lived beta emitters, for uranium, and for the transuranic alpha emitters.

Analyses are made of the effluent for the long-lived radionuclides only since cooling time and hold-up time in the waste effluent system is such that short-lived radionuclides are not present. The fraction of the activity comprised by each isotope is determined from the analyses. A weighted average maximum permissible concentration for water, $(MPC)_w$, for the mixture of radionuclides is calculated on the basis of the isotopic distribution using the MPC values of each isotope as recommended by the NCRP. The average concentrations of gross beta activity in the Clinch River are compared to the calculated $(MPC)_w$ values.

The concentration of uranium is compared with the specific $(MPC)_w$ value for uranium.

Gamma Measurements

External gamma radiation levels are measured monthly at a number of locations in the Oak Ridge Area. Measurements are taken with a Geiger-Muller tube at a distance of three feet aboveground, and the results are tabulated in terms of mr/hr.

Discussion of Data

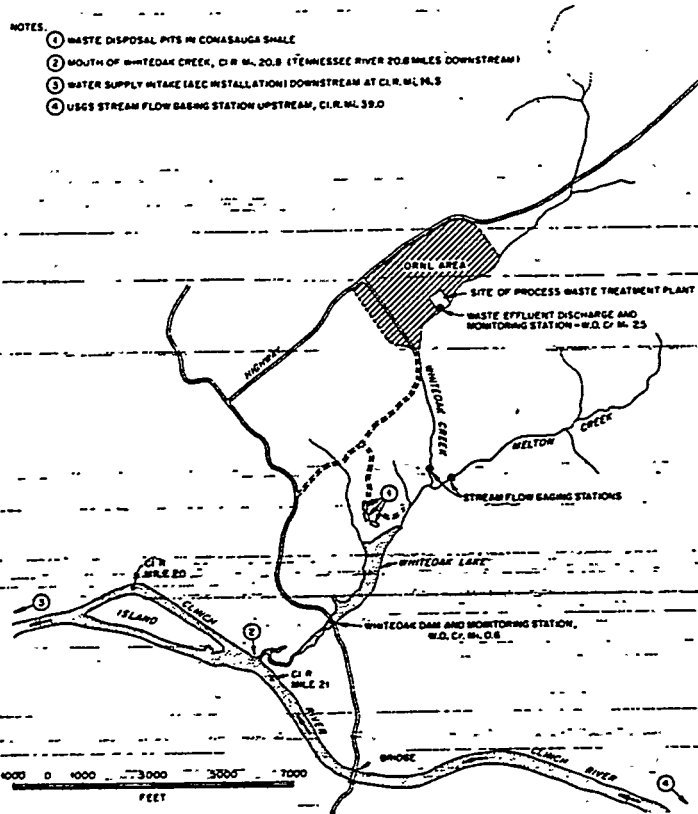
Data on the environmental levels of radioactivity for the fourth quarter of 1961 in the Oak Ridge and surrounding areas are presented in Table I through Table VI.

The average air contamination levels for gross beta activity, as shown by the continuous air monitoring filter data for the immediate and remote environs of the plants, were 3.5% and 4.1%, respectively, of the maximum permissible concentration for populations in the neighborhood of a controlled area. These values are approximately 70% higher than those of last quarter

UNCLASSIFIED
Date: 1-17-2008

NOTES:

- ① WASTE DISPOSAL PITS IN CONASAUGA SHALE
- ② MOUTH OF WHITEOAK CREEK, C.R. M. 20.8 (TENNESSEE RIVER 20.8 MILES DOWNSTREAM)
- ③ WATER SUPPLY INTAKE (AEC INSTALLATION) DOWNSTREAM AT C.R. M. 14.3
- ④ USGS STREAM FLOW GAGING STATION UPSTREAM, C.R. M. 39.0



Location Sketch Map
ORNL Area Surface Drainage

Figure 4

UNCLASSIFIED
ORNL-LR-DWG. 49222R1

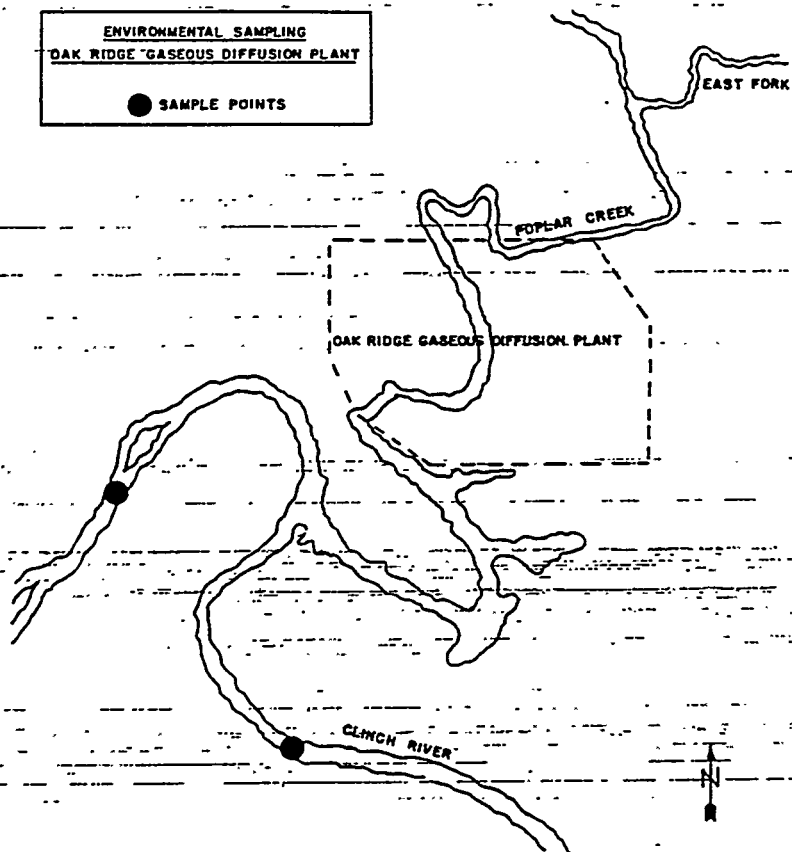


Figure 5

but are no greater than the average of those measured in other areas of the United States and reported by the U. S. Public Health Service Radiation Surveillance Network for the first two months of this quarter.

The average air-borne alpha activity in the environs of the ORGDP, five miles from ORGDP, was 12% of the maximum permissible concentration for populations in the neighborhood of a controlled area.

The average concentrations of radioactivity in the Clinch River at Mile 20.8, the point of entry of most of the wastes, and at Mile 4.5, near Kingston, Tennessee, were 5.2×10^{-7} $\mu\text{c/cc}$ and 2.4×10^{-7} $\mu\text{c/cc}$ respectively. These values are 8.8% and 5.5% of the weighted average maximum permissible concentration as recommended by the National Committee on Radiation Protection. The average concentration of transuranic alpha emitters in the Clinch River at Mile 20.8 was 0.7×10^{-11} $\mu\text{c/cc}$ which is 0.0001% of the weighted average (MPC)_w value.

The average activity of natural uranium materials in the Clinch River, reflecting the effects of all Oak Ridge Plants, was only 0.01% of the (MPC)_w for uranium.

External gamma radiation in the Oak Ridge Area averaged 0.02 mr/hr. This level is not significantly different from the average of the levels measured throughout the United States by the U. S. Public Health Service Surveillance Network.

Conclusion

The air and ground contamination in both the immediate and remote environs of Oak Ridge was influenced by fall-out from sources other than local plant operations. From analysis of the data taken, it is concluded that the Oak Ridge Operations contributed little to the air or ground contamination found in the neighborhood of the area controlled by the Atomic Energy Commission.

While some radioactivity is being contributed to the Clinch River by the release of low level radioactive liquid wastes from local operations, the resulting concentrations in the river are well below the maximum permissible concentration recommended by the NCRP for populations in the neighborhood of an atomic energy installation.

TABLE III

CALCULATED AVERAGE CONCENTRATION OF RADIOACTIVITY
IN THE CLINCH RIVER AT MILE 20.8

Fourth Quarter, 1961

Number of Samples Taken	Units of 10^{-7} $\mu\text{c/cc}$			% of $(\text{MPC})_w$
	Maximum	Minimum	Average	
91	27.0	0.27	5.2	8.8

TABLE IV
AVERAGE CONCENTRATION OF MAJOR RADIOACTIVE CONSTITUENTS
IN THE CLINCH RIVER

Fourth Quarter, 1961

Location	Units of 10^{-8} $\mu\text{C}/\text{cc}$						% of (MPC) _w
	Sr ⁹⁰	Ce ¹⁴⁴	Cs ¹³⁷	Ru ¹⁰³⁻¹⁰⁶	Co ⁶⁰	Average Gross Beta Activity	(MPC) _w ^a
M1, 33.2	0.08	0.04	0.05	0.9	0.06	0.28	128
M1, 20.8 ^b	0.28	0.10	0.25	37	0.30	52	590
M1, 4.5	0.33	0.18	0.09	21	0.36	24	427
							0.22
							8.8
							5.5

^a Weighted average (MPC)_w calculated for the mixture using (MPC)_w values for specific radionuclides recommended in the NBS Handbook 69.

^b Values given for this location are calculated values based on levels of waste released and the dilution afforded by the river.

TABLE V
URANIUM CONCENTRATION IN THE CLINCH
RIVER
Fourth Quarter, 1961

Sampling Point	Type of Analyses Made	No. of Samples	Units of 10^{-8} $\mu\text{c/cc}$				% (MPC) _w
			Maximum	Minimum	Average	(MPC) _w	
Upstream from ORGDP	Uranium Concentration	13	0.56	0	0.11	2000	< 0.01
Downstream from ORGDP	Uranium Concentration	12	0.70	0	0.23	2000	0.01

Normal Sampling Frequency: Continuous, composited over one week.

TABLE VI
EXTERNAL GAMMA RADIATION LEVELS

mr/hr

Fourth Quarter, 1961

Station Number	Location	October	November	December	Average
1	Solway Gate	0.015	0.026	0.021	0.021
2	Y-12 East Portal	0.015	0.021	0.020	0.019
3	Newcomb Road, Oak Ridge	0.016	0.022	0.021	0.020
4	Gallagher Gate	0.019	0.025	0.025	0.023
5	White Wing Gate	0.017	0.021	0.018	0.019
Average		0.016	0.023	0.021	0.020

ChemRisk Document Request Transmittal Form

(This section to be completed by ChemRisk)

Name S. Sandberg / Division _____ is requested to provide the following document

Address _____

Date of Request 12/10 Expected receipt of document 12/21

Title of requested document Environmental Levels of Radioactivity 1961

Document Number 800903

Access Number of Document _____ Date of Document 3/29/62

(This section to be completed by Derivative Classifier)

Derivative Classifier R. G. Jordan Phone 4 1645

Date document transmitted to Dr. Quist 4/15/93 1/29/93

Date release received from Dr. Quist OK 082 1/29/93

PUBLIC RELEASE STAMP attached to each copy of document (YES NO)

Date document sent to reproduction _____ Expected Return _____

Delivered to DRC by _____ Date _____

(This section to be completed by DRC)

Received by DRC _____ Date _____

Processed _____

Mailed _____

1993 FEB -3 PM 5:52

OAK RIDGE K-25 SITE DOCUMENT RELEASE FORM

Person requesting release JENNIFER LAMB (CHEMRISK)

Mailing Address K-1200 MS-7262

Date by which release is required _____

Some documents require special review.

Rec'd K-25CO: 1/29/93
 J. Lamb
 File-K-25CO-RC(4710)
 AS Quist, 2/1/93

4-0745

(Standard processing time is 5 working days. Long time will be longer.)

Note: Two copies of the document must generally be provided to the Classification and Information Control Office with this request. Only one copy of photos and videotapes is required. Documents that include photos must be accompanied by "originals" of the photos.

Approval of request for Classification and Information Control Office to release document (department head or higher):

Signature: _____ Date _____

DOCUMENT DESCRIPTION (to be completed by requester)

Document number UNNUMBERED/800903

Pages 15

Document title DISSEMINATION TO THE PUBLIC OF DATA ON ENVIRONMENTAL LEVELS OF RADIOACTIVITY

Author(s) (indicate other divisions or organizations, if applicable) CE LARSON

Document type (See Doc. Prep. Guide, Chs. 1 and 2, for definitions of document types):

- | | | | | |
|---|--|--|-----------------------------------|--|
| <input type="checkbox"/> Formal Report | <input type="checkbox"/> Progress Report | <input type="checkbox"/> Informal R&D Report | <input type="checkbox"/> Abstract | <input type="checkbox"/> Drawing |
| <input type="checkbox"/> Administrative | <input checked="" type="checkbox"/> Correspondence | <input type="checkbox"/> Internal Technical Data | <input type="checkbox"/> Photo | <input type="checkbox"/> Other Visuals |
| <input type="checkbox"/> Journal Article (identify journal): _____ | | | | |
| <input type="checkbox"/> Oral Presentation (identify meeting, sponsor, location, date): _____ | | | | |

Will oral presentation be published in program, booklet, brochure, etc.? ☐ Yes ☐ No ☐ Not Known

Will copies of the oral presentation be distributed ☐ before, ☐ after, ☐ during the meeting? ☐ No distribution will be made.

☐ Other (specify): _____

Purpose of release

HEALTH STUDY FEASIBILITY PROJECT

Previously cleared documents containing similar information _____

Is copyrighted material contained in this document? (If present, attach release.) ☐ Yes ☒ No

Remarks _____

CLASSIFICATION INFORMATION (to be obtained by requester)

Was the work reported in this document funded, in whole or in part, by a classified program at Martin Marietta Energy Systems, Inc.?

☐ No ☐ Yes (Name of program: _____)

Is the subject area of this document closely related to a prior or current classified program at Martin Marietta Energy Systems, Inc.?

☐ No ☐ Yes Within the Department of Energy? ☐ No ☐ Yes

Name or Description of applicable program(s) _____

Additional remarks _____

This document contains no classified information.

Derivative Classifier Signature _____

Date 1/14/93

DISTRIBUTION LIMITATIONS (If any) (completed by requester)

☐ Unrestricted, unlimited

Distribution may be limited because this document contains information that is:

☐ Unclassified Controlled Nuclear Information *

☐ Naval Nuclear Propulsion Information *

☐ Sensitive Nuclear Technology *

☐ Safeguards Information *

☐ Applied Technology *

☐ Gov't Confidential Commercial Information *

☐ Small Business Innovation Research *

☐ Cooperative R&D Agreement *

☐ Export Controlled *

☐ Proprietary

☐ Official Use Only

☐ Other

* Generally identified by sponsor

Remarks: _____

PATENT INFORMATION (completed by requester)

Does this document disclose any new equipment, process, or material?

☐ Yes

☐ No

If yes, list the patent significance and identify page number(s) and line number(s) in the space immediately following (or attach separate pages).

PATENT SECTION ACTION (completed by Patent Section upon request by the Classification and Information Control Office)

☐ Document may be released for publication

☐ Document must be reviewed by DOE Patent Group before release

☐ Document contains patentable information and may not be released at this time

Remarks: _____

Patent Section Representative _____

Date _____

CLASSIFICATION AND INFORMATION CONTROL OFFICE ACTION (completed by Classification and Information Control Office)

Classification Office
Action Taken:

☐ Not approved for release (see below)

☐ Approved for release with changes (see below)

☐ Approved for release without change

Classification Officer signature _____

Date _____

Technical Information
Office Action Taken:

☐ Not approved for release (see below)

☐ Approved for release with changes (see below)

☒ Approved for release without change

Technical Information Officer Signature _____

Date _____

Send to OSTI?

☐ Yes

☐ No

Category Distribution: _____

DOCUMENT NUMBER: UNNUMBERED/800903

DOCUMENT TITLE: ENVIRONMENTAL LEVELS OF RADIOACTIVITY FOR THE OAK
RIDGE AREA (REPORT FOR FOURTH QUARTER 1961)

AUTHORS: APPLIED HEALTH PHYSICS SECTION (ORNL)

DOCUMENT TYPE: REPORT

DOCUMENT DATE: 00-00-61

PURPOSE OF RELEASE: HEALTH STUDY FEASIBILITY REPORT

COPY RIGHTED MATERIAL: NO
